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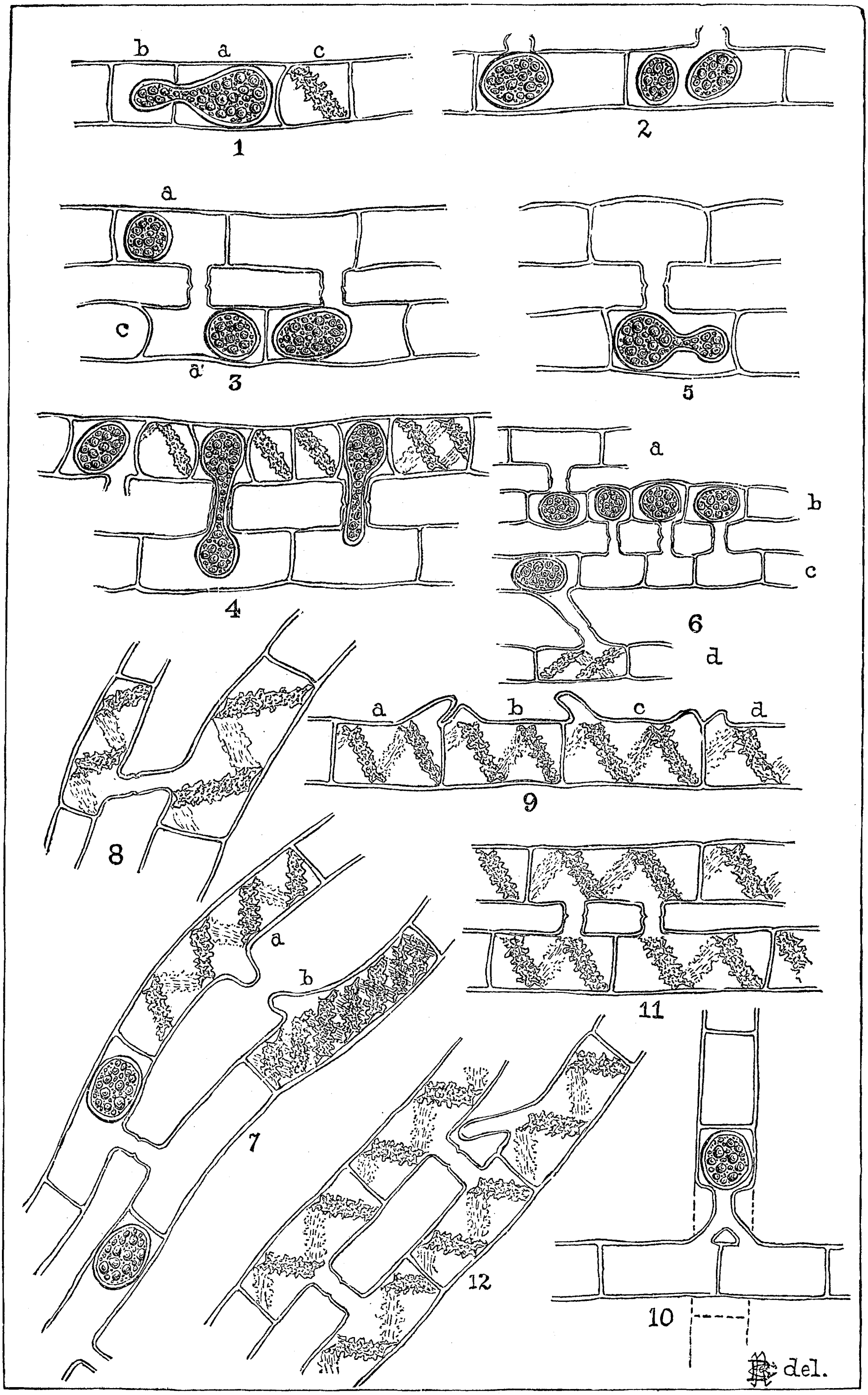

ROSE ON SPIROGYRA.

writer can not but fail to give the reader an adequate conception of the brilliancy of such garden scenery and of the astonishing luxuriance of vegetation. Men and their habitations sink into insignificance beside the enormous trunks and heads of giant trees, and the busy town itself, looked at from the neighboring hills, lies hidden beneath their branches. * * * * Bananas and mangoes are plenty, and sell two for one cent. The mango, which when ripe is a delicious fruit, will be in its perfection in about a week, and will then sell much cheaper."

Again, in a letter to Dr. Gray, he writes: "Here, also, as in North America, June seems to be the month of flowers, at least as regards the cultivated ornamental shrubs and trees in Port of Spain. At present Poinsettia takes the lead, and shows off in great splendor. Think of specimens of this beautiful shrub 15 feet high, head 10 to 15 feet in diameter, with such an abundance of crimson leaves (4 to 7 inches long) as to hide nearly all the green leaves. The season for mangoes came to a close about the first of August, to be succeeded by what is here called 'Governor's Plums.' Next came the season for bread-fruit, ending about the 24th of October, and now we are entering the season for oranges."

Very soon he commenced collecting specimens for the herbarium, the ferns, as usual, being the first to demand attention. Within five miles of his residence he found, within a few weeks, "about 70 species." His aim was to make 50 sets for sale, and in the course of two months he had prepared more than 2,800 specimens. Those botanists who are so fortunate as to have these specimens can well allow his claim, that "as regards completeness, freshness of color and expression of characteristics" they were "all that could reasonably be desired and expected." As a demand arose he collected many specimens of mosses, lichens and phanerogamous plants.

Notes on the Conjugation of Spirogyra.

BY JOE N. ROSE.

During nearly two years study of the various species of *Spirogyra,* conducted in the botanical laboratory of Wabash College, my attention was repeatedly drawn to exceptional features in their conjugation. At Professor Coulter's request I have collected my notes upon this subject and figured the more striking cases. In explanation of the accompanying plate it should be said that it is entirely diagrammatic, with a view of bringing out the salient points, although most of the original drawings were made with a camera. This text is intended to be little more than an explanation of the figures, and but little interpretation of the facts is attempted.

Figure 1. In this case (*Sp. longata*) a single well matured zygospore fills most of the larger (*a*) and part of the smaller (*b*) cell. No evidence of conjugation other than through the partition between the two cells could be discovered. The old cell wall remaining somewhat firm accounts for the neck of the zygospore. In the vegetative cell (*c*) is seen a constant result of the formation of a zygospore in a contiguous cell. In the fertilized cell (*a*) pressure seems to have been removed sufficiently to allow the pressure in the vegetative cell (*c*) to push outward the intervening partition, just as happens to a partition when a contiguous cell has been ruptured.

Figure 2. Occasionally two zygospores are found in the same cell, formed by the one act of fertilization, but usually somewhat smaller than those in adjoining cells.

Figure 3. Between the cells *a* and *a'* the usual conjugating tube has developed, and doubtless there has been a certain union of the contents, yet in each cell there is a perfect zygospore. They are not quite so large as those of adjoining cells. This condition of things was found as often as three times in the same pair of filaments. The bulging of the cell *c* into *a'*, owing to a relief of pressure in the latter, is apparent, but becomes very noticable in the next figure.

Figure 4. When a filament has broken up into unusually short cells and then conjugates with a large-celled filament, there is not always room for the zygospore in the female cell, and such distorted forms as those shown in the figure are the result. In this case the bulging walls of the vegetative cells have still further diminished the space.

Figure 5. The dumb-bell zygospore of this figure could not be explained, unless some such condition as in Fig. 1 shaped it until it became rigid. But of this there was not the slightest indication.

Figure 6. While in general terms in the case of conjugating filaments one may be called fertile and the other sterile, as expressing the usual direction of flow, yet zygospores are repeatedly found in the latter. In this figure there are four contiguous filaments. The first cell of *b* has been provided for by *a*, hence the first cell of *c* is compelled to send out a very long tube towards *d*. But the contents of *c* have already assumed the zygospore form while *d* still has its spiral band, as though the latter was too long in being reached.

Figure 7. In the two filaments represented conjugation has already taken place between some cells, and is being prepared for between *a* and *b*, yet *a* is a single banded cell, while in *b* there are two bands. So far as could be determined these two filaments represent two species, based upon the number of spiral bands.

Figure 8 shows an unusually great difference in the size of conjugating cells.

Figure 9. In this filament no conjugation was discovered in any part of it, but the cells *a* and *b* have each sent out a tube at their adjoining ends, as *c* and *d* are also beginning to do, while *c* has sent out an additional tube at the other end.

Figure 10 is doubtless a later stage of the last, the two tubes together conjugating with a third and lower cell.

Figure 11 is another phase of polygamous conjugation, while *Figure 12* shows strong inclinations in that direction.

GENERAL NOTES.

Acer pseudo-platanus is a common shade-tree about our streets. The fruit is now forming and in every raceme I find one or more of the samaras composed of three or four carpels, instead of the normal number, two.

Catalogue of New Brunswick Plants.—We are indebted to Mr. George U. Hay, of Carleton, N. B., for the Bulletin of the Natural History Society New Brunswick, No. IV. This contains "A preliminary list of the plants of New Brunswick," by Prof. James Fowler, M. A. The Rev. Mr. Fowler was for a long time a resident of New Brunswick, and has been the most active collector of the region. He now resides at Kingston, Ontario. We are surprised to find how recently botanical observation began in this province, and feel as if we could almost rank ourselves among the early collectors. The earliest published information dates back only to 1862, and in 1864 the writer collected largely about Fredericton, St. Stephen, and Campo Bello, continuing his work in the years 1866, 1868 and 1872. Unfortunately he has preserved very little material from those explorations. To return to Mr. Fowler's list, it is an extremely interesting one in many ways; its author was indefatigable in his researches. He has found some curious cases of extra-limital distribution. For instance at Eel River, Restigouche County, *Collomia linearis* occurs. "If it is not native, it is at least thoroughly naturalized." Mr. G. F. Mathew, of St. John, has elsewhere pointed out how the river St. John affects the distribution of plants. Indeed, the whole district is well worth further study. There are rich collecting grounds already familiar, like the marshes of the Kennebeckosis, but the flora of much the larger part of the province remains practically unknown. The members of the geological survey record what they find, but their attention is too much engaged upon other work to allow careful exploration. Not the least interesting part of the list is the appended catalogue of ballast plants gathered around St. John, Portland, etc. The list is well edited and printed, and will repay careful perusal.

Utricularia cornuta.—On Decoration Day it has been my habit for a long time to take an excursion in the woods. This year I was rewarded by seeing a most magnificent display of *Utricularia cornuta*, a mass of yellow liter-